ZAPARA, S[illegible]; METS, Yu.S.; KHRAPACH, V.G.

Short-delay blasting and ways of increasing its efficiency in a pit of the Krivoy Rog Southern Mining and Ore-dressing Combine. Sbor. nauch. trud. NIGRI no.7:39-46 '60. (MIRA 14:12)
(Krivoy Rog Basin—Blasting)

ZAPARA, S.A., kand.tekhn.nauk; METS, Yu.S., inzh.

Use of delayed-action blasting "in waves" in the construction of an open pit in the Krivoy Rog Basin. Shakht. stroi. 5 no.5:24-25 My '61. (MIRA 14:6)

1. Nauchno-issledovatel'skiy gornorudnyy institut.
(Krivoy Rog Basin--Iron mines and mining)
(Blasting)

ZAPARA, S.A., gornyy inzh.; METS, Yu.S., gornyy inzh.

Kutiple-row short-delay blasting in Krivoy Rog Basin mines. Gor. zhur. no. 6:33-34 Je '61. (MIRA 14:6)

1. Nauchno-issledovatel'skiy gornorudnyy institut, Krivoy Rog. (Krivoy Rog Basin--Blasting)

ZAPARA, S.A., inzh.; METS, Yu.S., inzh.

Optimum parameters of boring and blasting operations in blasting with grooved rows of boreholes. Izv. vys. ucheb. zav.; gor. zhur. 5 no.3:74-81 '62. (MIRA 15:7)

1. Nauchno-issledovatel'skiy gornorudnyy institut. Rekomendovana tekhnicheskim soveshchaniyem TSentral'nogo gornoobogatitel'nogo kombinata.

(Krivoy Rog Basin--Blasting)
(Boring)

ZAPARA, S.A.; METS, Yu.S.

Efficient parameters of boring and blasting operations in pits of the Central Mining and Ore-Dressing Combine. Vsryv. delo no.51/8:247-256 '63. (MIRA 16:6)

1. Krivorozhskiy gornorudnyy institut.
(Krivoy Rog Basin—Blasting) (Boring)

U

ALEKSEYEV, F.K.; ANDRIYUTS, G.L.; ARSENT'YEV, A.I.; ASTAF'YEV, Yu.P.; BEVZ, N.D.; BEREZOVSKIY, A.I.; GENERALOV, G.S.; DOROSHENKO, V.I.; YESHCHENKO, A.A.; ZAPARA, S.A.; KALINICHENKO, V.F.; KARNAUSHENKO, I.K.; KIKOVKA, Ye.I.; KOBOZEV, V.N.; KUPIN, V.Ye.; LOTOUS, V.K.; LYAKHOV, N.I.; MALYUTA, D.I.; METS, Yu.S.; OVODENKO, B.K.; OKSANICH, I.F.; PANOV, V.A.; POVZNER, Z.B.; PODORVANOV, A.Z.; POLISHCHUK, A.K.; POLYAKOV, V.G.; POTAPOV, A.I.; SAVITSKIY, I.I.; SERBIN, V.I.; SERGEYEV, N.N.; SOVETOV, G.A.; STATKEVICH, A.A.; TERESHCHENKO, A.A.; TITOV, O.S.; FEDIN, A.F.; KHOMYAKOV, N.P.; SHEYKO, V.G.; SHEKUN, O.G.; SESTAKOV, M.M.; SHTAN'KO, V.I.

Practice of construction and exploitation of open pits of Krivoy Rog Basin mining and ore dressing combines. Gor. zhur. no.6: 8-56 Je '63. (MIRA 16:7)

(Krivoy Rog Basin—Strip mining)

KOLESNICHENKO, I.T., METS, Yu.S., POTAPOVA, I.G.

Using "zernogranulit" 80/20 underground. Vzryv. delo [illegible]
98-114 '64. (MIRA 17:10)

PANOV, V.A., kand. tekhn. nauk; METS, Yu.S.; LYAKHOV, N.I.; OKSANICH, I.F.

Improvement of boring and blasting operations in mining and ore dressing combines of the Krivoy Rog Basin. Met. i gornorud. prom. no.3:53-55 My-Je '65. (MIRA 18:11)

KOLESNICHENKO, ..., gornyy inzh., METS, Yu.S., kand. tekhn. nauk

Charge of efficient design composed of loose explosive materials.
Gor. zhur. no.4:70-71 Ap '65. (MIRA 18:5)

KOLESNICHENKO, I.T., inzh.; METS, Yu.S., kand. tekhn. nauk

Industrial testings of AS-8 granulite and 79/21B "sernogranulit" in underground mining. Gor. shur. no.10:54-56 O '65. (MIRA 18:11)

L 23993-66 EWT(m) WW/JWD

ACC NR: AP6004659 SOURCE CODE: UR/0127/65/000/010/0054/0056

AUTHOR: Kolesnichenko, I. T. (Engineer); Mets, Yu. S. (Engineer, Candidate of technical sciences)

41
39
B

ORG: none

TITLE: Industrial tests of AS-8 granulite and 79/21V granule-granulite underground

SOURCE: Gornyy zhurnal, no. 10, 1965, 54-56

TOPIC TAGS: underground explosion, test, solid explosive, explosive charge

ABSTRACT: Industrial underground explosive tests of a new brand of granulite (AS-8) and granule-granulite (79/21V) were conducted in 1963-1964 in several mines of the Krivorog Basin. These new brands of VV explosives are oxygen-balanced large-grain powders convenient for the pneumatic charging of mine shafts. Their explosion characteristics are as high a ammonite No. 6 (see Table 1). It is shown that the detonation of granule-granulite and ammonite No. 6 produces an almost identical quantity of toxic gases, and that AS-8 produces less. The individual experiments in the mine shafts and some of their results are presented and discussed. Orig. art. has: 3 tables.

UDC: 622.235.2:622.272

Card 1/2

L 23993-66

ACC NR: AP6004659

2

Table 1. Experimental explosive characteristics of VV.

Indexes	AS-8 Granulite	79/21V Granule-granulite	Ammonite No. 6
a) Энергия взрыва, ккал/кг	1140	990	1000
b) Работоспособность, см³	420—440	360—370	360—380
c) Скорость детонации, км/сек	3,0—3,5	3,2—3,6	3,6—4,2
d) Критический диаметр открытого заряда, мм	70—100	30—60	10—12

a) Explosion energy, kcal/kg; b) Efficiency, cm^3; c) Detonation velocity, km/sec;
d) Critical diameter of open charge, mm

SUB CODE: 19 / SUBM DATE: none

Card 2/2

ACC NR: AP6035660 (A) SOURCE CODE: UR/0127/66/000/011/0047/0049

AUTHORS: Mets, Yu. S. (Candidate of technical sciences); Kolesnichenko, I. T. (Engineer)

ORG: none

TITLE: Detonating charges for priming low-sensitivity explosive materials

SOURCE: Gornyy zhurnal, no. 11, 1966, 47-49

TOPIC TAGS: reliability, detonation, toluene, explosive charge, explosive, underground explosion

ABSTRACT: The results from a study involving the effectiveness of detonating charges are given. The work was done to increase the reliability of charge detonation in boreholes in the open-pit mines of the Krivoy Rog Basin. The following detonating charges were tested: T-300, T-400, TP-400, TT-500, TT-1800, TG-300, TL-300, and LZ-2600. The completeness of detonation and the volume of the funnel in the ground were determined. It was found that the trotyl-tetryl and trotyl-hexogene detonators (TT-500, TT-1800, and TG-300) were promising. They have high power for their comparatively low weight and are more sensitive to detonation than pressed and poured trotyl charges and are more reliable. Orig. art. has: 2 tables and 1 diagram.

SUB CODE: 19 / SUBM DATE: none UDC: 622.235.411

Card 1/1

KOLESNICHENKO, I.T.; METS, Yu.S.

Analysis of the 80/20 B "zernogranulit" and a new variety of the C granulite. Met. i gornorud. prom. no.4:65-67 Jl-Ag '65. (MIRA 18:10)

METSA, Herbert; PARVEL, Kalju; JUSKE, M., red.; KOHU, H., tekhn. red.

[Main problems of the interrelation between production and consumption during the transition to communism]Tootmise ja tarbimise seostamise pohikusimusi uleminekul kommunismile. Tallinn, Eesti Riiklik Kirjastus, 1961. 41 p. (Eesti NSV Poliitiliste ja Teadusalaste Teadmiste Levitamise Uhing, no.312) (MIRA 15:7)

(Economics)

METSAALT, M.

AGRICULTURE

Periodical: SOTSIALSTLIK PÕLLUMAJANDUS Vol. 14, no. 2, Jan. 1959

METSAALT, M. Raising calves at the Vändra Experiment Station. p. 56.

Monthly List of East European Accessions (LEAI) LC, Vol. 9, No. 5, May 195[illegible], Unclas.

PLAVIL'SHCHIKOV, Nikolay Nikolayevich; METSAR, J.[translator]; MAGI, K., red.; TIMMER, K., tekhn. red.

[Homunkulus; talks on biological history] Homunkulus; jutustusi bioloogia ajaloost. Tallinn, Eesti riiklik kirjastus, 1961. 507 p. (MIRA 15:5)

(Natural history)

HABERMAN, Harald; VILBASTE, J., red.; METSAR, J., red.; TOOMSALU, E., tekhn. red.

[Leaf and flea beetles of Estonia; Chrysomelidae, Halticinae] Eesti hupikpoilased; chrysomelidae, halticinae. Tartu, Eesti Teaduste Akad. 1962. 217 p. (MIRA 16:2)
(Estonia—Leaf beetles) (Estonia--Flea beetles)

JÄRVEKÜLG, Arvi; VELDRE, Ivar; METSAR, J., red.; TIMMER, K., tekhn. red.

[Life in the Baltic Sea] Elu Laanemeres. Tallinn, Eesti Riiklik Kirjastus, 1963. 350 p. (MIRA 16:12)
(Baltic Sea--Marine biology)

USATENKO, B.; ALLIKAS, V.; KOSILEHT, A.; METSAR, J., red.;
TÕNISSON, A., tekhn. red.

[Aquarium] Akvaarium. Tallinn, Eesti Riiklik Kirjastus, 1963. 383 p. (MIRA 16:12)
(Aquariums)

PRIILINN, Oskar; METSAR, J., red.

[Problems in modern genetics] Kaasaja geneetika küsimusi [Tallinn, Eesti Riiklik Kirjastus, 196.. 47 p. [In Estonian] (MIRA 18:3)

ROTKOVA, S.V., starshiy bibliograf; METSATUN'YAN, I.A., bibliograf; TANANAYEV, I.V., akademik, otv.red.; TRONEV, V.G., doktor khim. nauk, nauchnyy red.; SPIVAKOVA, E.M., red.; PEREL'MAN, F.M., doktor khim.nauk, nauchnyy red.; SPERANSKAYA, Ye.I., kand.khim. nauk, nauchnyy red.; DEYCHMAN, E.N., kand.khim.nauk, nauchnyy red.; BASHILOVA, N.I., mladshiy nauchn.sotrudnik, nauchnyy red.; BOL'SHAKOVA, N.K., mladshiy nauchn.sotrudnik, nauchnyy red.; KASHINA, R.S., tekhn.red.

[Chemistry of rare elements; bibliographic index of Soviet and foreign literature] Khimiia redkikh elementov; bibliograficheskii ukazatel' otechestvennoi i zarubezhnoi literatury. Moskva, Izd-vo Akad.nauk SSSR. No.1. (1951-1954). 1960. 418 p.
(MIRA 13:11)

1. Biblioteka Otdeleniya khimicheskikh nauk AN SSSR (for Rotkova).
2. Institut obshchey i neorganicheskoy khimii im. N.S.Kurnakova (for Tronev, Perel'man, Speranskaya, Deychman, Bashilova, Bol'shakova).
(Bibliography--Metals, Rare and minor)

METSAYK, K., kapitan-nastavnik; SOLDATOV, V., kapitan

Siberian people need a motorship of this type. Rech. transp. 19 no.4:52-53 Ap '60. (MIRA 14:3)

1. Yeniseyskoye parokhodstva (for Metsayk). 2. Teplokhod "Turgenev" (for Soldatov).
(Siberia—Ships)

18.8200 1520, 1413, 2408

84297
S/022/60/013/002/006/007
C 111/ C 333

AUTHORS: Durgaryan, A. A., Metsburyan, A. M.

TITLE: Internal Friction of Aluminum in Dependence on the Vibrational Amplitude, the Preceding Plastic Deformation and on the Time

PERIODICAL: Izvestiya Akademii nauk Armyanskoy SSR. Seriya fiziko-matematicheskikh nauk, 1960, Vol.13, No.2, pp.131-138

TEXT: The authors report on the experimental investigation of the dependence of the internal friction $tg\delta$ of aluminum on the vibrational amplitude A, the plastic torsional deformation ε and on the time. The experiments were carried out for frequencies $\sim$ 1 Hz according to the method of the torsional oscillations of (Ref.8). Results: 1. Non-linear dependence of the internal friction on A. 2. If the measurements are started with high amplitudes and if then the amplitudes are diminished, then the curves for internal friction show characteristic maxima (see (Ref.1,2,6)). 3. The curves $tg\delta = f(\varepsilon)$ lie much lower for frequencies of 0.3 Hz than for the frequence 1.5 Hz. 4. For given deformations $tg\delta$ is almost constant after 2.5 hours. A comparison of the results with (Ref.2,3,4) shows that for low frequencies the considered dependences are the same

Card 1/2

84297
S/022/60/013/002/006/007
C 111/ C 333

Internal Friction of Aluminum in Dependence on the Vibrational Amplitude, the Preceding Plastic Deformation and on the Time

as for high frequencies.

There are 6 figures, and 8 references: 4 Soviet and 4 American.

ASSOCIATION: Yerevanskiy gosudarstvennyy universitet (Yerevan State University)

SUBMITTED: October 19, 1959

Card 2/2

METSCH, M.

METSCH, M. Terrace-type working of layers of crude oil. p. 502.

Vol. 6, no. 10, Oct. 1955
RUMANIAN-SOVIET friendship
Bucuresti, Rumania

So: Eastern European Accession Vol. 5 No. 4 April 1956

L 38311-66

ACC NR: AP6027971 SOURCE CODE: RU/0007/66/017/002/0072/0074

AUTHOR: Metsch, M. (Engineer)

ORG: none

TITLE: Location and correction of defects in underground lines

SOURCE: Petrol si gaze, v. 17, no. 2, 1966, 72-74

TOPIC TAGS: pipeline, petroleum industry equipment

ABSTRACT: A survey of the modern devices and apparatus used to detect and locate defects in underground lines, particularly the location of leaks in underground liquid or gas pipelines and the discovery of gaseous hydrocarbons in the atmosphere. Orig. art. has: 4 figures. [Based on author's Eng. abst.] [JPRS: 36,559]

SUB CODE: 13 / SUBM DATE: none

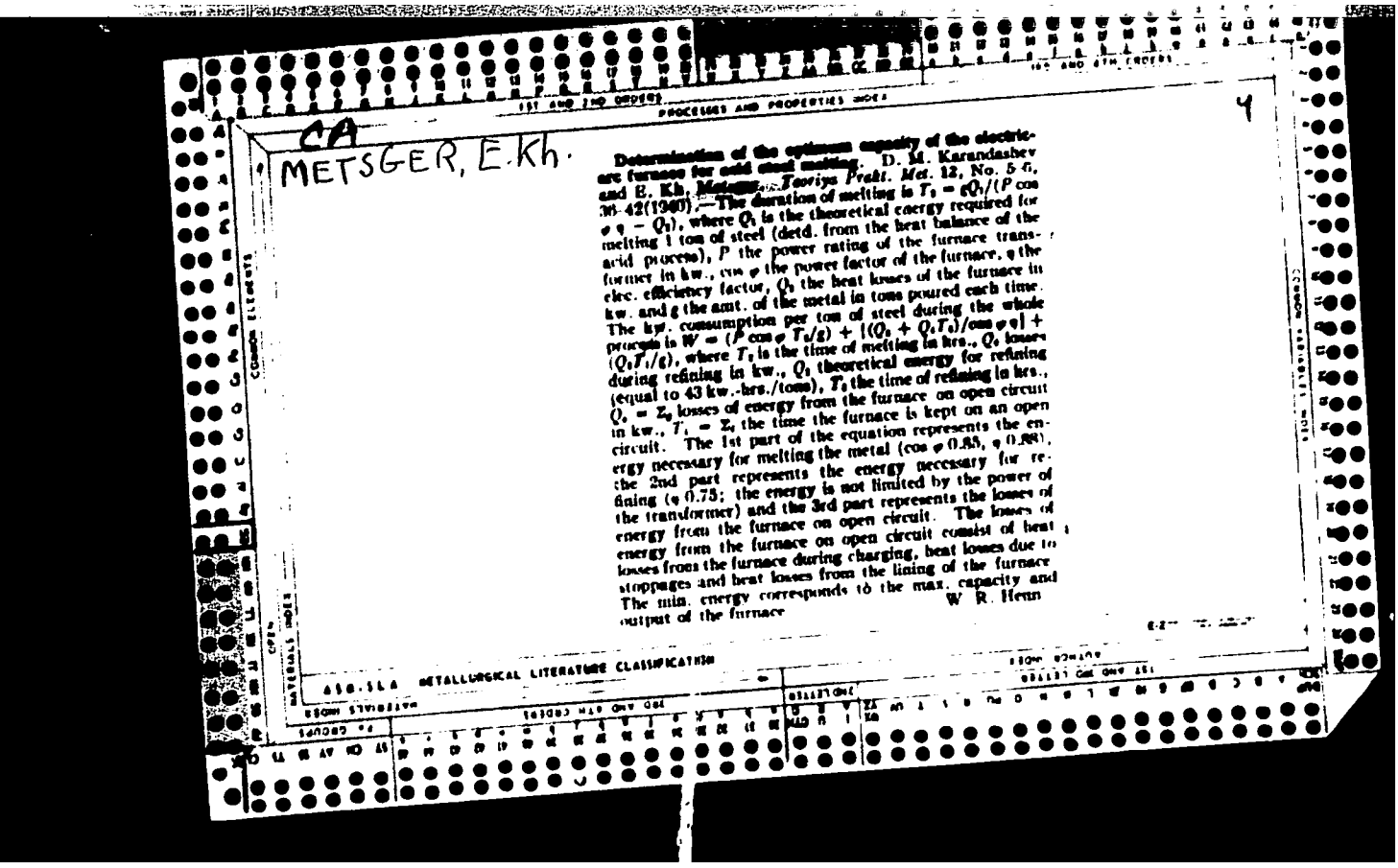
Card 1/1 UDC: 621.643.2.004.64

METSEL', N.G.

USOV, Yu.N.; METSEL', N.G.

Conversion of hydrocarbons in the presence of oxide catalysts.
Part 8: Conversion of n-hexadecane over a molybdenum catalyst.
Zhur.ob.khim. 27 no.7:1759-1762 Jl '57. (MIRA 10:10)

1.Saratovskiy gosudarstvennyy universitet.
(Hexadecane)



CA

METSGER, E.Kh.

4

Determination of the optimum capacity of the electric arc furnace for cold steel melting. D. M. Karandashev and E. Kh. Metsger. *Tsvetn. Metally Prakt. Met.* 12, No. 5 6, 38-42(1940).—The duration of melting is $T_0 = Q_1/(P \cos \varphi \eta - Q_2)$, where Q_1 is the theoretical energy required for melting 1 ton of steel (detd. from the heat balance of the acid process), P the power rating of the furnace transformer in kw., $\cos \varphi$ the power factor of the furnace, η the elec. efficiency factor, Q_2 the heat losses of the furnace in kw. and g the amt. of the metal in tons poured each time. The kw. consumption per ton of steel during the whole process is $W = (P \cos \varphi T_0/g) + [(Q_3 + Q_4 T_3)/\cos \varphi \eta] + (Q_4 T_4/g)$, where T_0 is the time of melting in hrs., Q_3 losses during refining in kw., Q_4 theoretical energy for refining (equal to 43 kw.-hrs./tons), T_3 the time of refining in hrs., $Q_3 = \Sigma_3$ losses of energy from the furnace on open circuit in kw., $T_3 = \Sigma_4$ the time the furnace is kept on an open circuit. The 1st part of the equation represents the energy necessary for melting the metal ($\cos \varphi$ 0.85, η 0.88), the 2nd part represents the energy necessary for refining (η 0.75; the energy is not limited by the power of the transformer) and the 3rd part represents the losses of energy from the furnace on open circuit. The losses of energy from the furnace on open circuit consist of heat losses from the furnace during charging, heat losses due to stoppages and heat losses from the lining of the furnace. The min. energy corresponds to the max. capacity and output of the furnace. W. R. Hemn

A50-5L4 METALLURGICAL LITERATURE CLASSIFICATION

BEREZIN, Nikolay Nikolayevich; M TSGER, Edvin Khristianovich, st. insh.; KOZULIN, B., red.; PAL MINA, N., tekhn. red.

[Building materials fr m Nizhniy Tagil District] Stroitel'nye materialy Nizhne-Tagil skogo raiona. Sverdlovsk, Sverdlovskoe knizhnoe izd-vo, 1959. 148 p. (MIRA 16:6)

1. Nachal'nik TSentral noy laboratorii stroitel'nykh materialov tresta "Tagilstroy" (for Berezin). 2. TSentral'naya laboratoriya stroitel'nykh materialov tresta "Tagilstroy" (for Metsger).
(Nizhniy Tagil District--Building materials)

BEREZIN, N.N.; BETSGER, E.Kh., [illegible] V.I., inzh., red.

[Rolled panels for walls of waterproofed gypsum slag concrete for sanitary engineering systems; practices of the "Tagilstroi" Trust of the Sverdlovsk Economic Council] Prokatnye paneli peregorodok iz vodostoikogo gipsoshlakobetona dlia sanitarno-tekhnicheskikh [illegible], opyt tresta "Tagilstroi" Sverdlovskogo sovnarkhoza. Moskva, Gosstroiizdat, 1962. 25 p. (MIRA 17:7)

1. Akademiya stroitel'stva i arkhitektury SSSR, Nauchno-issledovatel'skiy institut organizatsii, mekhanizatsii i tekhnicheskoy pomoshchi stroitel'stvu.

SKOROBOGATOV, S.M., inzh.; METSGER, E.Kh.

Strength, rigidity, and fissure resistance in mesh-reinforced foamed slag concrete beams. Trudy Ural. politekh. inst. no.110:50-56 '61. (MIRA 14:7)
(Beams and girders—Testing)
(Lightweight concrete—Testing)

CHUVATOV, V.V.; BEREZIN, N.N.; METSGER, E.Kh.; NAGIN, V.A.; KARTASHOV, N.A., kand. tekhn. nauk, dots.; MIL'KOV, N.V., kand. tekhn. nauk; BYCHKOV, M.I., kand. tekhn.nauk, dots.; SUKHANOV, V.P., SHLYAPIN, V.A.; KORZHENKO, L.I.; ABRAMYCHEV, Ye.P.; KAZANTSEV, I.I.; YARES'KO, V.F.; LUKOYANOV, Yu.N.; DUDAROV, V.K.; BALINSKIY, R.P.; KOROTKOVSKIY, A.E.; PONOMAREV, I.I.; NOVOSEL'SKIY, S.A., kand. tekhn.nauk, dots.; IL'INYKH, N.Z.; TSITKIN, N.A.; ROGOZHIN, G.I.; PRAVOTOROV, B.A.; ORLOV, V.D.; RACHINSKIY, M.N.; KULTYSHEV, V.N.; SMAGIN, G.N.; KUZNETSOV, V.D.; MACHERET, I.G.; SHEGAL, A.V.; GALASHOV, F.K.; ANTIPIN, A.A.; SHALAKHIN, K.S.; RASCHEKTAYEV, I.M.; TISHCHENKO, Ye.I.; FOTIYEV, A.F.; IPPOLITOV, M.F.; DOROSINSKIY, G.P.; ROZHKOV, Ye.P.; RYUMIN, N.T.; AYZENBERG, S.L.; GOLUBTSOV, N.I.; VUS-VONSOVICH, I.K., inzh., retsenzent; GOLOVKIN, A.M., inzh., retsenzent; GUSELETOV, A.I., inzh., retsenzent; KALUGIN, N.I., inzh., retsenzent; KRAMINSKIY, I.S., inzh., retsenzent; MAYLE, O.Ya., inzh., retsenzent; OZERSKIY, S.M., inzh., retsenzent; SKOBLO, Ya.A., dots., retsenzent; SPERANSKIY, B.A., kand. tekhn. nauk, retsenzent; SHALAMOV, K.Ye., inzh., retsenzent; VOYNICH, N.F., inzh., red.; GETLING, Yu., red.; CHERNIKHOV, Ya., tekhn. red.

[Construction handbook] Spravochnik stroitelia. Red.kollegiia: M.I. Bychkov i dr. Sverdlovsk, Sverdlovskoe knizhnoe izd-vo. Vol.1. 1962. 532 p. Vol.2. 1963. 462 p. (MIRA 16:5)
(Construction industry)

KHYUSSE, I.Yu. [Husse, I.]; METSIK, R.E., MFTSIK, L.Yu. [Metsik, L.]

Investigating the process of the formation of calcium chloride in the tar and tar water from the semicoking of oil shale in gas generators. Khim. i tekh. gor. slan. i prod. ikh. perer no.10:257-263 '62.

Investigating the composition of inorganic chloride compounds in the products of the semicoking of oil shale in gas generators. Ibid.:264-277 (MIRA 17:5)

KHYUSSE, I.Yu. [Husse, I.J.]; METSIK, R.E.; METSIK, L.Yu. [Metsik, L.J.]

Sediments on atmospheric distillation column plates and in experimental pipe stills for processing tar at the shale processing combine in Kohtla-Jarve. Khim. i tekh. gor. slan. i prod. ikh perer. no.9:132-138 '60. (MIRA 15:6)
(Kohtla-Jarve--Oil-shale industry--Equipment and supplies)

KHYUSSE, I.Yu. [Husse, I.]; METSIK, R.E.; METSIK, L.Yu. [Metsik, L.]

Investigating the process of the formation of calcium chloride in the tar and tar water from the semicoking of oil shale in gas generators. Khim. i tekh. gor. slan. i prod. ikh perer. no.10:257-263 '62.

Investigating the composition of inorganic chloride compounds in the products of the semicoking of oil shale in gas generators. Ibid.:264-277 (MIRA 17:5)

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[redacted]

[redacted]

[redacted]

SOV/112-58-2-1875

Translation from: Referativnyy zhurnal, Elektrotekhnika, 1958, Nr 2, p 13 (USSR)

AUTHOR: Metsik, M. S.

TITLE: Surface Electric Conductance of Freshly Sheared Mica Crystals (Poverkhnostnaya elektroprovodnost' svezhikh skolov kristallov slyudy)

PERIODICAL: Izv. Tomskogo politekhn. in-ta, 1956, Vol 91, pp 413-424

ABSTRACT: General laws have been discovered of irreversible surface electric conductance of freshly sheared crystals, which help to figure out the processes of surface sorption activity of freshly split mica crystals. To eliminate the deleterious effect of fresh splitting of mica crystals on mica insulating characteristics, mica plates should be seasoned in the air for 2-3 days, or dried at about 100°C for 0.5-1 hour, or washed with water or alcohol. Any of these surface treatments removes the conducting electrolytic film from the crystal and eliminates irreversible phenomena brought about by the film.
Bibliography: 10 items. Gos. un-t (State University), Irkutsk.

L.A.E.

Card 1/1

SOV/112-58-2-1876

Translation from: Referativnyy zhurnal, Elektrotekhnika, 1958, Nr 2, p 13 (USSR)

AUTHOR: Metelk, M. S.

TITLE: Work of Splitting Mica Crystals (Rabota rasshcheplen'ya kristallov slyudy)

PERIODICAL: Izv. Tomskogo politekhn. in-ta, 1956, Vol 91, pp 427-436

ABSTRACT: Methods for determination of work of mica crystal splitting by means of adhesion meter or pendulum type outfit are described. Effect of specimen thickness on the tearing off work has been determined, as well as effects of speed, humidity, air pressure, and temperature on the splitting work. The work of mica crystal splitting increases with increase in tearing off speed; at a considerable speed, it increases with the increase in thickness of the plate torn off; it decreases with increase of relative humidity of air; it is independent of air pressure within 725-2 mm of mercury column if water-vapor pressure is invariable; it depends on temperature at which tearing off is made. The above facts can be explained by electrification of crystal surfaces at the moment of splitting. A number of observations are cited (by Obreimov, Krotov and Karasev, by Deryagin, Krotov and the author) of an electric field formation

Card 1/2

Work of Splitting Mica Crystals

between mica leaves when the crystals are split; a theoretical interpretation of results is offered. Bibliography: 12 items. Gos. un-t (State University), Irkutsk.

L.A.E.

DEYUGIN, B. V., METZIK, M. S.
DEYUGIN
Institute of Physical Chemistry of Acad. Sci. USSR, Moscow.

"The Effect of the Electric Forces in the Process of Splistting of Micas"
Paper submitted at

Program of the Conference on the Non-Metallic Solids of Mechanical Properties.

May 19 - 26, 1958 m Leningrad

METSIK, M.S.

Optical method for determining the work done in cleaving mica crystals. Izv. vys. ucheb. zav.; fiz. no.2:58-65 '58. (MIRA 11:6)

1. Irkutskiy gosuniversitet im. A.A. Zhdanova.
(Mica)

METSIK, M.S.; ZHIDIKHANOV, R.A.

Experimentally measured d_{001} of phlogophite and moscovite when being heated. Izv. vys. ucheb. zav.; fiz. no.2:66-72 '58. (MIRA 11:6)

1.Irkutskiy gosuniversitet im. A.A. Zhdanova.
(Mica) (Crystallography)

SOV/70-3-1-20/26

AUTHORS: Metsik, M.S. and Zhidikhanov, R.A.

TITLE: An Experimental Study of the Changes in the Interplanar d_{001} Spacing During Heating in Phlogopite and Muscovite Crystals (Eksperimental'noye izucheniye izmeneniy mezhploskostnogo rasstoyaniya d_{001} pri nagrevanii u kristallov flogopita i muskovita)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 1, pp 95-98 (USSR)

ABSTRACT: The experiments were carried out on a Bragg spectrometer equipped with a special crystal holder and electrical heater. Linear expansion coefficients of the above crystals were measured and the results obtained are given in Table 1. The linear expansion of soft forms of phlogopite crystals follows a linear law only up to 80 - 100 °C. At higher temperatures the expansion coefficients decrease. In soft phlogopites which have a large d_{001} thermal expansion is greater than in hard phlogopites. In studying the thermal expansion of these crystals an anomalous contraction of the crystal was observed on heating. As can be seen in Figures 1 and 2

Cardl/4

An Experimental Study of the Changes in the Interplanar d_{001} Spacing During Heating in Phlogopite and Muscovite Crystals

and also in Table 2, the contraction consists of a reversible and irreversible parts. The variation of d_{001} with temperature and also the variation of the half-width h and intensity of reflections S with temperature are shown in Figure 1-3 for soft phlogopites, hard phlogopites and muscovite crystals respectively. In these figures, 1 denotes first heating and 2 second heating. The reversible part of the dependence of $\Delta d/d$ on temperature shows a dip in the corresponding curve between 70 and 200 °C. This dip is of the order of 0.3%. The irreversible part of the contraction leads to a reduction in the coefficient of expansion and, after cooling of the specimen, determines the final reduction in the interplanar spacing. Subsequent heating leads to an increase in the irreversible contraction of the order of 1%. Table 3 gives the change in d_{001} (in %) for different temperatures. First column of this table

An Experimental Study of the Changes in the Interplanar d_{001} Spacing During Heating in Phlogopite and Muscovite Crystals

gives the temperature; the second gives the change in d_{001} for soft phlogopite; the third column gives the change in d_{001} in hard phlogopite and the fourth column gives this quantity for muscovite. The duration of the heating in each case was 0.5 hours. The parameters of phlogopite crystals also change when the crystals are placed in water. The reversible part of the lattice contraction may be explained, according to the present authors, by changes in the orientation of water dipoles with temperature. A partial loss of these molecules from the lattice as a result of diffusion may lead to irreversible contraction.
There are 6 figures, 5 tables, and 4 Soviet references.

Card3/4

SOV/70-3-1-20/26

An Experimental Study of the Changes in the Interplanar d_{001} Spacing During Heating in Phlogopite and Muscovite Crystals

ASSOCIATION: Irkutskiy gosudarstvennyy universitet
(Irkutsk State University)
Institut fizicheskoy khimii AN SSSR
(Institute of Physical Chemistry of the Ac.Sc.USSR)

SUBMITTED: December 18, 1956

Card 4/4

SOV/139-58-4-3/30

AUTHOR: Metsik, M. S.

TITLE: On the Question of the Nature and Magnitude of the Energy of Inter-zone Reactions in Mica (K voprosu o prirode i velichine energii mezhpaketnogo vzaimodeystviya v kristallakh slyudy)

PERIODICAL: Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika 1958, Nr 4, pp 29-32 (USSR)

ABSTRACT: Interzone reaction energy is electrostatic in origin and can in principle be formulated and computed entirely in terms of the ionic coulombian forces within a unit cell and between one cell and its neighbours. Such a procedure is, however, in general both cumbersome and unnecessary. The 'packet' concept facilitates an integrated treatment of the interaction energy, and for a good approximation only immediately neighbouring packets need be considered. A dipole surface density can be associated with the ionic displacements resulting from packet interactions. The problem is then to formulate the density distribution function which is essentially a geometric property of the basic lattice and packet size For packet dimensions around 10 Å the interaction energy

Cardl/2

On the Question of the Nature and Magnitude of the Energy of Inter-zone Reactions in Mica

density in mica is in the region of 100 to 200 erg cm^{-2}
There are 2 figures, 1 table and 4 references, 3 of which are Soviet, 1 English.

ASSOCIATION: Irkutskiy gosuniversitet imeni A. A. Zhdanova
(Irkutsk State University imeni A. A. Zhdanov)

SUBMITTED: October 2, 1957

AUTHOR: Metsik, M. S.

TITLE: Investigation of the Electrification of Mica Crystals at the Moment of Cleavage, by a Kerr-Effect Method (Issledovaniye elektrizatsii kristallov slyudy v moment rasshchepleniya metodom Kerr-effekta)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, fizika, 1958, Nr 5, pp 108-110 (USSR)

ABSTRACT: The principle of this method is, quite simply, to use the well known relation between electric field (E) and surface charge density (σ) to measure the latter. The required relation reads:

$$E = \frac{4\pi\sigma}{\varepsilon}$$

where ε is the dielectric constant. The field E is measured by means of the Kerr effect according to the relation :

$$\varphi = 2\pi B l E^2 .$$

Here φ is the angle of optical rotation induced in a Kerr cell of length l, by field E ; for a liquid having Kerr coefficient B . In the experimental arrangement two Kerr cells are located at opposite ends of the piece of mica

Card 1/3

Investigation of the Electrification of Mica Crystals at the Moment of Cleavage, by a Kerr-Effect Method

under investigation; one cell serves as a control and the cleavage faces actually form part of the other cell. The intensity I of a plane-polarised beam of light transmitted through the cells is related to its initial intensity I_o by:

$$I = I_o \sin^2 \frac{\varphi}{2} \qquad (3)$$

The intensities I and I_o are measured photoelectrically, the corresponding photo-currents being i and i_o ; the density of charge on the cleavage surfaces is then given by the following relation:

$$\sigma = \frac{\varepsilon}{4\pi} \sqrt{\frac{\arcsin \sqrt{\frac{i}{i_o}}}{\pi B l}} \qquad (4)$$

Card 2/3

Investigation of the Electrification of Mica Crystals at the Moment of Cleavage, by a Kerr-Effect Method

Since all other quantities on the right side of this equation are known, the measurement of i and i_0 enables σ to be determined. Surface charge densities of 100 - 60 absolute units per cm^2 were measured by this method when the separation of the cleavage surfaces was about 5 mm. The paper contains 1 figure and 5 references, all of which are Soviet.

ASSOCIATION: Irkutskiy gosuniversitet imeni A. A. Zhdanova (Irkutsk State University imeni A. A. Zhdanov)

SUBMITTED: April 7 1958.

Card 3/3

AUTHOR: Kuchin, V. D., Candidate of Technical Sciences SOV/105-58-7-25/32

TITLE: Conference on Solid Dielectrics and Semiconductors (Konferentsiya po tverdym dielektrikam i poluprovodnikam)

PERIODICAL: Elektrichestvo, 1958, Nr 7, pp. 85 - 86 (USSR)

ABSTRACT: The conference took place from February 3rd to February 8th, 1958, in the Tomsk Polytechnical Institute (Tomskiy politekhnicheskiy institut), Section of Properties of Dielectrics. Professor A.A.Vorob'yev (TPI) reported on the great number of investigations in the theory of ionic dielectrics, of cystallization, of the mechanical and electric properties of dielectrics and practical insulation. He showed that the properties of the binary compounds are divided into two groups: the one group of properties increases with increasing lattice energy, the other is reduced. Docent M.S.Metsik, Irkutsk University (Irkutskiy universitet) developed a theory according to which the cleavage-work in mica crystals is composed of the work against the dipole forces and the work for the separation of the double layer and in the last case results in an electrostatic mosaic. Docent N.I. Vorob'yev (TPI) reported on the results of the investigation of

Card 1/4

dielectric constant, of the losses, the electric strength, and the specific volume resistance under temperature influence, moisture, tropical conditions, in the corona products "fluoroplast-4", "fluoroplast-3", polyethylene, polymonochlorostyrene, "product-10", thermoreactive compounds, and urethane. M.S.Ivankina (TPI) measured the factor of linear expansion and the heat produced in the formation of solid solutions of the KCl - RbCl, KCl - KBr - and NaCl - NaBr system in dependence on the composition in the range of from 25 to 100° C. A. N.Kislina (TPI) found that the simple relations between the physical and chemical properties of the monocrystals of alkali-halide salts and their electrical strength (as described previously in the papers of A.A.Vorob'yev), are not always established in the case of solid solutions. Docent P.A.Savintsev and others (TPI) found that the strength of alkali--halide solutions determined according to the method of boring and mutual grinding increases with increasing molecular concentration its change according to its composition following a curve with a minimum. Docent V.V.Puchkovskiy, Chelyabinsk Institute of Mechanization and Electrification of Agriculture (Chelyabinskiy institut mekhanizatsii i elektrifikatsii sel'skogo khozyaystva) by means of experiments found that the dependence of the maximum

overheating temperature in the center of the small plate on the temperature of the surrounding air has maxima in the case of a change of this temperature of from 2o - 1oo° C.

Section of Ceramics: V.M.Belousov (TPI) gave a calculation of the ceramic structure. Docent V.A.Presnov and others (SFTI) reported on investigations of the vacuum-tight ceramic structure and the nature of the ceramic-metal boundary.

Section of Crystallization: Professor A.M. Kuz'min and assistants (TPI) dealt with geological problems. S.A.Stroitelev (TPI) gave a method for the selection of effective admixtures. A.P.Izergin developed a method and an equipment for the purification of liquids from small admixture quantities.

In the joint session of the sections concerned with the breakdown of solid dielectrics, ceramics, polarization, losses, and conductivity Professor N.I.Shishkin spoke about the "Electric Conductivity of Solidified Glasses". The final general meeting was opened by Ye.G.Papush (Dnepropetrovsk Institute of Railway Traffic Engineers) who reported on the "Foundations of the Theory of Polarons". I. Ye.Balygin and A.P.Rumyantsev reported on the investigation of the dissusion processes of the silver isotope

Conference on Solid Dielectrics and Semiconductors SOV/105-58-7-25/32

Ag^{110} in amorphous and crystalline quartz, and in agglomerated oxides as Al_2O_3, ZrO_2 and TiO_2.

ASSOCIATION: Tomskiy politekhnicheskiy institut (Tomsk Polytechnical Institute)

1. Dielectrics--USSR 2. Semiconductors--USSR 3. Conferences

Card 4/4

METSIK, M S

AUTHOR: Vol'kenshteyn, M. V., Doctor of Physico-Mathematical Sciences SOV/30-58-9-41/51

TITLE: Investigation of Mechanical Properties of Non-Metals (Izucheniye mekhanicheskikh svoystv nemetallov) Conference in Leningrad (Konferentsiya v Leningrade)

PERIODICAL: Vestnik Akademii nauk SSSR, 1958, Nr 9, pp. 109 - 111 (USSR)

ABSTRACT: The Mezhdunarodnyy soyuz chistoy i prikladnoy fiziki i Akademiya nauk SSSR (International Society of Pure and Applied Physics and the AS USSR) held a conference from May 19th to 24th. A.F.Ioffe, Member, Academy of Sciences, USSR, made the opening-speech. Further reports were delivered by:
S.N.Zhukov on the influence of time and temperature on the strength of a great variety of materials.
B.V.Deryagin, M.S.Metsik on the part played by electric energies at the cleaving process of mica.
A.V.Stepanov on the destruction modes of crystals.
R.I.Garber, I.A.Gindin, L.M.Polyakov on the characterization of plastic deformations by means of the micro-fissures occurring.

Card 1/4

Investigation of Mechanical Properties of Non-Metals. SOV, 30-58-9-41/51
Conference in Leningrad

Yu.N.Ryabinin on the results of researches on plasticity.
A.N.Orlov, Yu.M.Plishkin on the results of theoretical calculations on stability conditions of a crystal model.
T.A.Kontorova on the influence of anharmonic oscillations of a lattice on plastic deformation.
M.V.Klassen-Neklyudova, V.A.Indenbom, A.A.Urusovskaya, G. Ye. Tomilovskiy on the results of optical crystal research.
M.P.Shaskol'skaya, Sun'Zhuyfan on observation of plastic deformation in rock-salt.
A.A.Chernov on a kinetic equation for "steps" on the crystal surface.
G.G.Lemleyn, Ye.D.Dukova presented a film on the formation of displaced growth centers and the vaporization of crystals
V.N.Rozhanskiy, Yu.V.Goryunov, Ye.D.Shchukin, N.V.Pertsov observed the emersion of dislocations on the crystal surface as well as the development of fissures.
R.I.Garber, Ye.A.Tsinzerling, M.A.Chernysheva on Problems of mechanic twin formation of crystals.
Ye.M.Yelistratov gave values obtained by radiographic examinations of mixed crystals and metallic alloys.

Card 2/4

Investigation of Mechanical Properties of Non-Metals. SOV/30-58-9-41/51
Conference in Leningrad

D.M.Vasil'yev examined micro-voltage occurring at plastic deformation in crystals.
M.I.Bessonov, S.K.Zakharov, G.A.Lebedev, Ye.A.Kuvshinskiy on the strength of amorphous bodies, especially polymers.
S.N.Zhurkov, V.A.Marikhin, A.I.Slutsker on the submicroscopic porosity of deformed polymers.
A.S.Akhmatov, L.V.Koshlakova, M.V.Vol'kenshteyn, A.I.Kitaygorodskiy on defective crystallic states.
A.F.Ioffe, Member, Academy of Sciences, USSR, closed the conference.

Card 3/4

METSIK N.S.

7-1-1 /30

AUTHOR: Metsik, [illegible] S.

TITLE: Electrization of Mica Crystal [illegible] (Elektri- zatsiya kristallov slyudy pri [illegible])

PERIODICAL: Zhurnal [illegible], 19[illegible], Vol. [illegible], Nr 1, [illegible] 1[illegible]-11[illegible] (USSR)

ABSTRACT: The mosaic-type picture in the electrization of crystal surfaces is proved by means of direct tests, the results [illegible] electro- static [illegible] ments of the absolute amount of the [illegible] charges are given [illegible] facts a[illegible] process. The time is determined fo[illegible] We can form certain conceptions on [illegible] evaluation [illegible] determination [illegible] mica - crystal surfa- ces [illegible] of the intensity of [illegible] 1.- method of mov- ces and carried out [illegible] movable probe [illegible] probe [illegible] method of [illegible] 3.- method of [illegible] is actually in electrostatic mosaic [illegible] is on the average 1 [illegible] single mosaic [illegible] order of 20 ial [illegible] of 7 - 2 V [illegible] observed mosaic units [illegible] cm² is obtained [illegible] electrization of the sur- [illegible] density is [illegible] or higher. [illegible]

Card 1/.

Electrization of Mica Crystals at Their Splitting [illegible]

faces [illegible] in the air too, but the [illegible] charges fixed [illegible] smaller in time [illegible] in vacuum and decreases quickly with the time. The author [illegible] that the potential of the probe and therefore [illegible] time according to [illegible] resistance) [illegible] $\sigma = \sigma_0 e^{-\alpha t}$. The velocity of the scatter [illegible] of the charge [illegible] the pressure of the [illegible] surface [illegible] the magnitude [illegible] From the experiment [illegible] vapor pressure of ~8 mm Torr $\alpha \approx 0{,}1$ sec^{-1} and with [illegible] $\alpha \approx .10^{-4}$ sec^{-1} it [illegible] of a dry air is [illegible] does not change. From this the author concludes that the [illegible] of the charges forming at the surface of the mica crystal [illegible] decision of the surface conductivity. When the experiment was made to observe the electrization at the splitting of a NaCl crystal with a typical ionic crystal such a phenomenon was not observed. [illegible] the electrization of mica crystals depends on their characteristics of structure. First of all on the structure of the surfaces with a rather perfect joint (spaynost') along which the decomposition of the crystal takes place. For the purpose of explaining the structure characteristics in the intermediate [illegible] temperature expansion of the lattice in a direction vertical to the joint

Card 2/4

Electrization of Mica Crystals at Their Splitting.

surfaces was investigated radiographically. An interesting fact was determined regarding the lattice shrinkage of the phlogopit crystals and at the earlier heated muskovit crystals. The shrinkage is observed in the temperature interval corresponding to the maximum of the heat effect, the sorption and the greatest swelling of the phlogopit crystals leads to an irreversible increase of the distance d_{001} between the surfaces of up to 1-2,5. In order to explain these effects some correction must be made regarding the present conception of the mica structure. The following 2 facts prove the insufficient character of these conceptions: 1.-Starting from the ion radii the distance between the packs is supposed not to exceed 2,80 Å. 2.-The suggested lattice model for phlogopit and muskovit do not determine the position in the structure of so-called semi-compound water which separates from crystals when heated up to from 400 to 600°C and the content of which differs from 0,5 to several percents. A scheme for the structure of the separating layer between the packs of the muskovit- and phlogopit crystals is given. It removes the above said contradictions. This scheme does not only coincide qualitatively with basic experimental data but it also explains quantitatively a great number of phenomena observed with mica. With this model the development of electrostatic charges on the surface of mica crystals on the cleavage of

Card 3/4

Electrization of Mic. Crystals at Their Splitting.

their splitting can be understood. The electrization takes place in consequence of the crystal crack according to the water-molecule layer. The results were discussed with B. V. Deryagin There are 6 figures, 10 references, 5 of which are Slavic.

ASSOCIATION: State University imeni Zhdanov, Irkutsk (State University imeni Zhdanova, Irkutsk)

SUB. TEL: December 30, 1956

AVAILABLE: Library of Congress

Card 4/4

ZHIDIKHANOV, R.A.; METSIK, M.S.

Physical mechanism of low-temperature swelling of mica. Izv.vys. uchab.zav.; fiz. no.3:164-169 '59. (MIRA 12:10)

1. Irkutskiy gosuniversitet imeni A.A.Zhdanova.
(Mica)

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SOV/181-1-7-11/21

AUTHOR: Metsik, M. S.

TITLE: Theory of Mica-crystal Splitting

PERIODICAL: Fizika tverdogo tela, 1959, Vol 1, Nr 7, pp 1084-1091 (USSR)

ABSTRACT: Splitting of mica-crystals is a major trouble source for the mica-processing industry; the main cause is considered to be the lack of a scientific theory supporting the splitting processes. The author gives a short description of the extraction of the mica lattice from talc, which is done by substituting aluminum ions for a quarter of silicon ions in the silicon-oxygen tetrahedra with the charge of the package being compensated by potassium ions; next, formula (1) is given for the computation of the specific work needed for the package-dipole splitting at fairly low temperatures. Results summarized in table 1 reveal that, when comparing the measured splitting work with the work done by the dipole forces, the dipole interaction exerts an influence on the splitting work, without, however, playing a major part in the process. The charge separation work of a double layer in the Coulomb field is next discussed, and equation (2) is given thereto. The split parts of a crystal (see figure 1) are, under certain conditions, to be regarded as electrostatically charged plates,

Card 1/3

Theory of Mica-crystal Splitting

and formula (3) is given for the splitting work in such case. Considering that electric charges dissipate over the split crystal surface in the course of time, the splitting work depends on the velocity of the splitting process. B. V. Deryagin and N. A. Krotova (Ref 8) offered three possibilities of electric surface-charge dissipation: (1) electric gas discharge; (2) autoelectronic emission from the surface; (3) surface conductivity. Experiments (Refs 3 and 4) revealed that the values attained by charge density in general are not so high as to cause an electric discharge to take place; they further showed that autoelectronic emission, if any, is only possible in the initial stage of the splitting process. Hence, surface conductivity can be the only essential factor in surface-charge dissipation. In agreement with the theory developed by B. V. Deryagin and V. P. Smilga (Footnote), the author gives equation (4) for the dependence of charge density on electrical conductivity, splitting rate, and coordinates x and y. Next, formula (12) is derived for the entire splitting work on the basis of the afore-mentioned results. This formula provides a good representation of the splitting work as depending on the medium, splitting rate, and thickness of the split layers. Three limit cases of formula (12) are then investigated, and finally, the

calculation of crystal electrification caused by the splitting process is discussed. Splitting experiments were made with two liquids possessing high surface conductance (water and alcohol), and computations were made on the basis of the theory in question. Results are summarized in table 2. Also results obtained from experiments made with benzene, dry and moist air are supplied. The author thanks B. V. Deryagin, Corresponding Member of the AS USSR, for his interest in the investigation, for checking results, and for remarks added to the manuscript. There are 3 figures, 2 tables, and 15 references, 14 of which are Soviet.

ASSOCIATION: Irkutskiy gosudarstvennyy universitet im. A. A. Zhdanova (Irkutsk State University imeni A. A. Zhdanov)

SUBMITTED: May 22, 1958

66331
SOV/181-1-10-5/21

~~24(6)~~ 24.7000

AUTHORS: Deryagin, B. V., Metsik, M. S.

TITLE: The Role Played by Electric Forces in Mica Splitting Along the Cleavage Planes

PERIODICAL: Fizika tverdogo tela, 1959, Vol 1, Nr 10, pp 1521 - 1528 (USSR)

ABSTRACT: The results published by Obreimov and Lazarev and various Western authors are supplemented by a number of experiments. The authors first measured the charge density resulting from the Kerr effect in nitrobenzene, which had been introduced into the crystal crack (for the device see figure 4). The mean charge density of Mama muscovites and Aldan phlogopites did not exceed 50 absolute charge units per cm^2. In some surface sections the charge density of muscovite and phlogopite attained 200-250 and 300 absolute charge units per cm^2, respectively. The potentials occurring in the cleavage planes are measured by means of fixed and movable probes of different size (for the device and measuring arrangement see figure 5). This series of measurements indicates that an electrostatic

Card 1/3

The Role Played by Electric Forces in Mica Splitting Along the Cleavage Planes

mosaic with elementary surface < 1 mm^2 and a mean charge density of 20 absolute charge units per cm^2 is formed in the new crystal planes. Figure 6 distinctly shows the abrupt behavior of the potentials. The charges effected at the instant of crystal cleavage were measured by means of an oscilloscope. The authors obtained also for this case ≈50 absolute charge units per cm^2. When the crystal is cleft in humid air, the charge recorded depends on the cleavage rate (cf. Fig 8). When the cleavage rate increases and humidity drops, the actual charge density on the cleft face rises and approaches a limit σ_o, which has a characteristic value for each crystal. If the crystal is cleft in a medium of a small degree of surface conductivity, or if the cleavage rate is high, the mosaic charge density does not vary throughout the cleavage and retains the value σ_o. The electrostatic part of the cleavage then reaches a maximum, it may be defined by:

Card 2/3

66331

The Role Played by Electric Forces in Mica Splitting Along the Cleavage Planes SOV/181-1-10-5/21

$$A_E = \frac{2\pi\sigma_o^2 y_m}{\epsilon}$$, where ϵ denotes the dielectric constant of the medium in which the cleavage occurred, and y_m the maximum distance at which the mosaic planes still act on one another. There are 8 figures, 1 table, and 12 references, 11 of which are Soviet.

ASSOCIATION: Institut fizicheskoy khimii AN SSSR (Institute of Physical Chemistry of the AS USSR). Irkutskiy gosudarstvennyy universitet (Irkutsk State University)

SUBMITTED: January 11, 1959

Card 3/3

S/139/60/000/005/022/031
E032/E114

24.7600 (1043, 1160, 1158)

AUTHOR: Metsik, M.S.

TITLE: Method of Measuring the Thermal Conductivity of Anisotropic Bodies and its Verification in the Case of Mica Crystals

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1960, No. 5, pp 131-136

TEXT: The paper begins with a discussion of the heat-conduction equation for a parallelopiped with sides X, Y and Z, made from an anisotropic material. This equation can be written down in the form

$$\frac{1}{a_i}\frac{\partial \vartheta}{\partial \tau} = \frac{\partial^2 \vartheta}{\partial x^2} + \frac{\partial^2 \vartheta}{\partial v^2} + \frac{\partial^2 \vartheta}{\partial w^2} \qquad (3)$$

where ϑ is the temperature difference between a point in the crystal and the surrounding medium, $a_i = \lambda_i / c\gamma$ $(i = 1, 2, 3)$, λ_i are the coefficients of thermal conductivity along the axes of the thermal conductivity ellipsoid of the crystal, c is the specific heat, γ is the density, $v = \sqrt{a_1/a_2}\, y$, and $w = \sqrt{a_1/a_3}\, z$.

Card 1/6

Method of Measuring the Thermal Conductivity of Anisotropic Bodies and its Verification in the Case of Mica Crystals

The solution of this equation is sought in the form of a product of two functions, one of which is a function of the coordinates only, and the other of time only, i.e.

$$v' = U_{(xvw)}\, T(\tau) \qquad (4)$$

Eq. (3) then reduces to two equations:

$$dT/d\tau = -\alpha_1 \mu^2 T, \qquad (5)$$

$$\nabla^2 U = -\mu^2 U \qquad (6)$$

where μ is a constant. The solution of Eq. (5) is

$$T = Ae^{-m\tau},$$

$$m = \alpha_1 \mu^2 = (\lambda_1/c\gamma)\, \mu^2. \qquad (7)$$

In the case of a parallelopiped the solution of Eq. (6) is:

$$U_{(xvw)} = \cos(\mu_1 x) \cos(\mu_2 v) \cos(\mu_3 w), \qquad (8)$$

Card 2/6

S/139/60/000/005/022/031
E032/E114

Method of Measuring the Thermal Conductivity of Anisotropic Bodies and its Verification in the Case of Mica Crystals

where $\mu^2 = \mu_1^2 + \mu_2^2 + \mu_3^2$ and can be found from the boundary conditions. The boundary conditions are:

$$\frac{\partial U}{\partial x} + h_1 U = 0 \quad \text{for} \quad x = \frac{X}{2} \text{ and arbitrary } y \text{ and } z,$$

$$\frac{\partial U}{\partial v} + h_2 U = 0 \quad \text{for} \quad v = \frac{Y}{2}\sqrt{(a_1/a_2)} \text{ and arbitrary } x \text{ and } z, \qquad (10)$$

$$\frac{\partial U}{\partial w} + h_3 U = 0 \quad \text{for} \quad w = \frac{Z}{2}\sqrt{(a_1/a_2)} \text{ and arbitrary } x \text{ and } y.$$

where $h_i = \alpha/\lambda_i$ $(i = 1, 2, 3)$ and α is the emissivity. The solution is then expressed in terms of the dimensionless quantities:

$$q_1 = \mu_1 \frac{X}{2}, \quad q_2 = \frac{Y}{2}\sqrt{(a_1/a_2)}\,\mu_2, \quad q_3 = \mu_3 \frac{Z}{2}\sqrt{(a_1/a_3)}, \qquad (11)$$

in which case the boundary conditions become:

Card 3/6

Method of Measuring the Thermal Conductivity of Anisotropic Bodies and its Verification in the Case of Mica Crystals

$$q_1 \operatorname{tg} q_1 = h_1 \frac{X}{2}, \quad q_2 \operatorname{tg} q_2 = h_2 \frac{Y}{2} \sqrt{(a_1/a_2)}, \qquad (12)$$

$$q_3 \operatorname{tg} q_3 = h_3 \sqrt{(a_1/a_3)} \; \frac{Z}{2}$$

When $a \to \infty$, Eqs (11) and 7) give

$$\mu_\infty = \frac{1}{K} = \frac{m_\infty}{a_1} = \left(\frac{\pi}{X}\right)^2 + \left(\frac{\pi}{Y\sqrt{a_1/a_2}}\right)^2 + \left(\frac{\pi}{Z\sqrt{a_1/a_3}}\right)^2 \qquad (13)$$

and the "form coefficient" K is given by Eq. (14). The infinite emissivity can be achieved by placing the crystal in a thermostat filled with continuously mixed water. Under these conditions

$$a_1 = K m_\infty = (\lambda_1/c\gamma), \qquad (15)$$

Card 4/6

Method of Measuring the Thermal Conductivity of Anisotropic Bodies and its Verification in the Case of Mica Crystals

$$\frac{\lambda''_1}{c\gamma} = \frac{m_\infty}{\pi^2\left[\frac{1}{x^2} + \frac{\lambda_2}{\lambda_1}\frac{1}{y^2} + \frac{\lambda_3}{\lambda_1}\frac{1}{z^2}\right]} \qquad (15)$$

If the experiment is carried out with three parallelopipeds cut in an identical way relative to the axes of the ellipsoid of thermal conductivity, then

$$\frac{m_\infty}{\frac{1}{x_1^2} + \frac{\lambda_2}{\lambda_1}\frac{1}{y_1^2} + \frac{\lambda_3}{\lambda_1}\frac{1}{z_1^2}} = \frac{m_\infty}{\frac{1}{x_2^2} + \frac{\lambda_2}{\lambda_1}\frac{1}{y_2^2} + \frac{\lambda_3}{\lambda_1}\frac{1}{z_2^2}} = \qquad (16)$$

$$= \frac{m_\infty}{\frac{1}{x_3^2} + \frac{\lambda_2}{\lambda_1}\frac{1}{y_3^2} + \frac{\lambda_3}{\lambda_1}\frac{1}{z_3^2}}$$

Card 5/6

85166

S/139/60/000/005/022/031
E032/E114

Method of Measuring the Thermal Conductivity of Anisotropic Bodies and its Verification in the Case of Mica Crystals

which uniquely defines the ratios of the axial thermal conductivities. Substituting the obtained values of λ_2/λ_1 and λ_3/λ_1 into Eq. (15), we can determine λ_1 and hence λ_2 and λ_3. The method was verified using mica crystals and the results obtained for the conductivities were found to be in excellent agreement with those obtained by other methods. There are 1 figure, 2 tables and 6 references: 1 German, 1 English and 4 Soviet.

ASSOCIATION: Irkutskiy gosuniversitet
(Irkutsk State University)

SUBMITTED: November 21, 1959

Card 6/6

METSIK, M.S.

On the nature of the forces of interaction between packets in mica crystals. Koll. zhur. 22 no.4:418-422 Jl-Ag '60. (MIRA 13:9)

1. Institut fizicheskoy khimii AN SSSR, Laboratoriya poverkhnostnykh sil Irkutskiy universitet.
(Mica)

METSIK, M. S.

PHASE I BOOK EXPLOITATION SOV/5590

Konferentsiya po poverkhnostnym silam. Moscow, 1960.

Issledovaniya v oblasti poverkhnostnykh sil; sbornik dokladov na konferentsii po poverkhnostnym silam, aprel' 1960 g. (Studies in the Field of Surface Forces; Collection of Reports of the Conference on Surface Forces, Held in April 1960) Moscow, Izd-vo AN SSSR, 1961. 231 p. Errata printed on the inside of back cover. 2500 copies printed.

Sponsoring Agency: Institut fizicheskoy khimii Akademii nauk SSSR.

Resp. Ed.: B. V. Deryagin, Corresponding Member, Academy of Sciences USSR; Editorial Board: N. N. Zakhavayeva, N. A. Krotova, M. M. Kusakov, S. V. Norpin, P. S. Prokhorov, M. V. Talayev and G. I. Fuks; Ed. of Publishing House: A. L. Bankvitser; Tech. Ed.: Yu. V. Rylina.

PURPOSE: This book is intended for physical chemists.

Card 1/8

COVERAGE: This is a collection of 25 articles in physical chemistry on problems of surface phenomena investigated at or in association with the Laboratory of Surface Phenomena of the Institute of Physical Chemistry of the Academy of Sciences USSR. The first article provides a detailed chronological account of the Laboratory's work from the day of its establishment in 1935 to the present time. The remaining articles discuss general surface force problems, polymer adhesion, surface forces in thin liquid layers, surface phenomena in dispersed systems, and surface forces in aerosols. Names of scientists who have been or are now associated with the Laboratory of Surface Phenomena are listed with references to their past and present associations. Each article is accompanied by references.

TABLE OF CONTENTS:

S/081/61/000/021/018/094
B102/B138

AUTHOR: Metsik, M. S.

TITLE: The role of surface forces in mica crystals

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 21, 1961, 67, abstract 21B544 (Sb. "Issled. v obl. poverkhnostn. sil", M., AN SSSR, 1961, 66-75)

TEXT: A relationship has been found between the electrotechnical properties of mica and the adsorption of H_2O on its surface. The interaction energy of H_2O adsorbed on K^+ and O^{2-} ions, relative humidity necessary for adsorption of one H_2O monolayer, interaction energy of packets of mica and the work of splitting on air and in vacuo are calculated on the basis of the lattice structure proposed by the author. The results are in good agreement with experimental data of other authors. When adsorbed on K^+ ion, the water molecule is oriented toward the oxygen side of the mica surface, and when adsorbed on O^{2-} toward the hydrogen side. As the depth of the H_2O film increases, electrical conductivity passes through a maximum and then reaches a constant value.

Card 1/2

This is because the initially amorphous H_2O film passes into a quasicrystalline state. Heating raises the mobility of the adsorbed H_2O, causing an increase in the dielectric constant and losses. [Abstracter's note: Complete translation.]

V

Card 2/2

S/139/61/000/006/017/023
E194/E484

AUTHORS: Afanas'yev, N.V., Metsik, M.S.

TITLE: The nature of dielectric loss in crystals of phlogopite mica

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy Fizika no.6, 1961, 132-140

TEXT: The present article gives preliminary results of a study of the dielectric properties of phlogopite mica as function of pressure and general considerations are given concerning the mechanism of dielectric loss and polarization in phlogopite crystals. Pressure was applied to the specimens through a mechanical system of levers and could reach values of some hundreds of kg/cm^2. Changes in specimen thickness during heating were measured with a micrometer head. The electrodes consisted of metallic silver deposited on the mica in vacuum. The specimen was placed between silvered steel discs which served both to make contact and to apply pressure to the specimen. The dielectric loss angle and capacitance of the specimen were measured at various frequencies in the range 50 c/s to 1.7 Mc/s using bridges types

Card 1/

The nature of dielectric loss ...

MDP (MDP) and MLYe-1 (MLYe-1) and Q-meter type KV-1 (KV-1) In one series of tests measurements were made of capacitance and dielectric loss angle of phlogopite as function of temperature at constant pressure using various pressures in the range 1 to 300 kg/cm^2. In a further series of tests the sample was heated to a certain temperature under a pressure of 300 kg/cm^2 and then at constant temperature, measurements were made of capacitance and dielectric loss angle as function of pressure as the pressure was reduced to a few mm of mercury. All the results were obtained on a single specimen of Aldan phlogopite mica of medium hydration The thickness of the specimen was 185 microns. The measurements were made after the sample had already been heated once in which condition changes in dielectric loss angle and capacitance with change of pressure are practically reversible. The electric field was applied perpendicular to the plane of cleavage Graphs of capacitance and tan δ for various pressures at a frequency of 0.5 Mc/s are shown in Fig.2, where 1,1' - tan δ and capacitance at a pressure of 1.2 kg/cm^2; 2,2' - 9.5 kg/cm^2, 3,3' - 50 kg/cm^2, 4,4' - 300 kg/cm^2, 5 - swelling as function of temperature at a

Card 2/0

The nature of dielectric loss ...

pressure of 1.2 kg/cm^2; 6 - same at pressure of 9.5 kg/cm^2. 7 - product of capacitance and tan δ at a pressure of 1.2 kg/cm^2 It is evident from the curves that the dielectric effects are directly associated with swelling of the mica. At sufficiently high pressures (300 kg/cm^2) the phlogopite practically does not swell in the temperature range considered and then tan δ and capacitance are substantially independent of temperature. The influence of pressure and the associated swelling on dielectric properties are clearly seen in isotherms of tan δ and capacitance plotted as function of pressure in Fig.3, where 1,1' - tan δ and capacitance at a frequency of 0.5 Mc/s; 2,2' - same for 10 kc/s. 3,3' - same for 50 c/s. The tests were made at a temperature of 230°C; the sample was heated under a pressure of 300 kg/cm^2 which was afterwards reduced to atmospheric without changing the temperature. It is noticed, and most clearly at the higher frequency, that there is a critical pressure below which the capacitance commences to fall, and tan δ commences to increase as the pressure is reduced. For a frequency of 0.5 Mc/s this critical pressure is 30 kg/cm^2, which is close to the saturated vapour pressure of steam at 230°C which is 28.5 kg/cm^2

Card 3/

The nature of dielectric loss ..

Measurements were also made at various frequencies with a constant pressure of 1.2 kg/cm^2 and it is found that whilst at high frequencies the temperature at which the tan δ is a maximum is practically constant, at audio-frequencies this maximum is displaced towards higher temperatures as the frequency is reduced It is quite evident that the electrical effects observed are associated with the effect of swelling which is accompanied by the formation in the crystal of lens shaped spaces filled with water vapour. The steep part of the swelling curve corresponds to a condition in which the spaces contain saturated steam in equilibrium with a water film adsorbed on the surface In the flatter part of the swelling curve the spaces have swelled and the steam is unsaturated. It is concluded that the changes in the dielectric properties of phlogopite mica during swelling can be explained by polarization between the layers of phlogopite due to the presence in them of combined water which, on heating is concentrated into the lens shaped spaces. There are 5 figures and 18 references: 17 Soviet-bloc and 1 non-Soviet-bloc

Card 4/

S/139/61/000/006/017/023
E194/E484

The nature of dielectric loss ...

ASSOCIATION: Irkutskiy gosuniversitet im. A.A.Zhdanova
(Irkutsk University imeni A.A.Zhdanov)

SUBMITTED: November 10, 1960

Card 5/1

S/139/62/000/006/011/032
E194/E155

AUTHORS: Afanas'yev, N.V., Popova, V.N., and Metsik, M.S.

TITLE: Dielectric properties of phlogopite mica crystals in the direction of cleavage

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, no.6, 1962, 64-71

TEXT: The dielectric properties of phlogopite mica were studied in the direction of cleavage to provide application data and because nearly all previous measurements have been made across the cleavage direction. The specimens were from mica crystals about 4 cm thick held in clamps and cut to 0.25 cm thick in the direction of cleavage. The ends of the specimens were polished and silvered electrodes of 2.44 cm diameter were deposited on them. With the specimens held in moist air and in vacuum at various temperatures in the range -100 to +350 °C, the permittivity ε' and the loss factor $\varepsilon'' = \varepsilon' \tan \delta$ were measured in the frequency range 50 c/s to 1.0 Mc/s using a Schering bridge or Q-meter, and resistivity ρ was also measured. A dispersion region occurs in the low frequency range and is attributed to the presence of

Card 1/2

conducting surfaces in the cleavage planes of the crystal, which are 'open' in the sense of being in communication with the ambient medium. A second dispersion region, which occurs in the radio and sonic frequency ranges at room temperature, is attributed to 'closed' regions. As the sample becomes wetter the two regions run together and ε'' and ε' reach high values (several hundred). As the samples are dried the regions separate and the dielectric properties improve. Finally, when the water adsorbed in the cleavage planes and other inclusions (for example ionic contamination which contributes to conductivity) have been removed, the dielectric properties become the same in the direction parallel to cleavage as in that perpendicular to it.
There are 5 figures and 2 tables.
ASSOCIATION: Irkutskiy gosuniversitet imeni A.A. Zhdanova
(Irkutsk State University imeni A.A. Zhdanov)

SUBMITTED: September 25, 1961

L 11047-66 EWT(1)/EWA(h)

ACC NR: AR5020043 SOURCE CODE: UR/0081/65/000/012/D044/D045

AUTHOR: Perevertayev, V.D.; Metsik, M.S.; Kupriyanov, V.M.

ORG: none

TITLE: Photoelectronic device for studying variations in the thickness of an adsorption film and the surface electroconductivity of fresh mica crystal chips

SOURCE: Ref. zh. Khimiya, Abs. 12D53

REF SOURCE: Sb. Kratkiye soobshch. o nauchno-issled. rabotakh za 1961 g. Irkutskiy un-t. Irkutsk, 1963, 47-49

TOPIC TAGS: mica, photoelectric detection equipment, electric conductance

TRANSLATION: A description is given of a photoelectronic device for the study of variations in the thickness of an adsorption film and of the surface electroconductivity of fresh mica crystal chips; this device eliminates the shortcoming of devices previously used. The crystal is placed in a carefully isolated vacuum chamber. The chipping of the crystal and the application of Ag-electrodes are done automatically. The concentration of H_2O steam in the chamber is done by evaporating frozen H_2O in liquid H_2. A continuous change in temperature is achieved by special thermostats. The variations in the intensity of the light flow is registered by FEU-29. The signal is amplified and upon detection it is transferred to the C-191 loop oscillograph. The data is recorded on a moving photofilm. I. Zimakov.

SUB CODE: 09,20

BVK

Card 1/1

L 25247-65 EWT(l)/EPA(s)-2/EEC(t) Pt-10/Pl-4 IJP(c) GG

ACCESSION NR: AR4045040 S/0196/64/000/007/B014/B015

SOURCE: Ref. zh. Elektrotekhnika i energetika, Abs. 7B94

3.5
B

AUTHOR: Afanas'yev, N. V.; Metsik, M. S.

TITLE: Nature of dielectric losses in flogopite crystals

CITED SOURCE: Izv. Leningr. elektrotekhn. in-ta, vy*p. 51, 1963, 211-220

TOPIC TAGS: mica, flogopite

TRANSLATION: Variation in the dielectric characteristics of flogopite as a result of heating is due to a bulging phenomenon accompanied by a formation of water-vapor-filled cavities in the crystal. Without bulging, ε and $\mathrm{tg}\,\delta$ of flogopite are independent of temperature; with bulging C drops and $\mathrm{tg}\,\delta$ varies passing through a maximum. As the pressure applied to the specimen increases, the bulging and the associated dielectric-characteristic variations come about at higher temperatures. Measurements within 50 cps — 1.7 Mc and from the room temperature to 300 C and with a pressure of 0—300 kg/cm² are reported. Five illustrations. Bibliography: 15 titles.

SUB CODE: SS,EM ENCL: 00

Card 1/1

ZHIDIKHANOV, R.A. [deceased]; LIOPO, V.A.; METSIK, M.S.

Some experimental data on the hydration of phlogopites. Izv.vys.ucheb. zav.; fiz.no.2:153-156 '63. (MIRA 16:5)

1. Irkutskiy gosudarstvennyy universitet imeni A.A. Zhdanova.
(Phlogopite) (Hydration)

ACCESSION NR: AP4036562 S/0139/64/000/002/0077/0083

AUTHORS: Perevertayev, V. D.; Metsik, M. S.

TITLE: Adsorption kinetics of films on freshly cut mica crystal surfaces and their electrical conductivities. 1

SOURCE: IVUZ. Fizika, no. 2, 1964, 77-83

TOPIC TAGS: adsorption kinetics, mica crystal, light polarization, phase shift, reflected light, adsorbed layer, refractive index

ABSTRACT: The light polarization method was used to measure the thickness h of very thin films on freshly cut mica crystal surfaces. The method consists of measuring the relative phase shifts δ and relative decrease in amplitude $\rho_{\parallel}/\rho_{\perp}$ of light reflected from the adsorbed layer given by

$$h = \frac{1}{\frac{c^{\parallel}}{a^{\parallel}+b^{\parallel}} + \frac{c^{\perp}}{a^{\perp}+b^{\perp}}} \cdot \frac{\lambda}{4\pi n_2 \cos\beta} \cdot \delta,$$

where a, b, and c are functions of Frenel coefficients on air-film and film-mica surfaces, λ is wavelength, n_2 is film refractive index, β is angle of incidence

on mica surface. The block schematic of the experimental set up is given in Fig. 1 on the Enclosure. Analysis showed δ to be strongly dependent on angle of incidence i_b. For maximum sensitivity i_b was selected as $57^{\circ}40'$. Various film thicknesses were obtained by controlling the humidity over the mica specimen inside an evacuated bell jar. The results showed a rise in film thickness to a maximum within 4 minutes after splitting the crystal. This was followed by a gradual decrease to an approximate equilibrium value at about 20 minutes. Thicknesses as small as 200 Å could be measured by this method. Orig. art. has: 13 formulas, 7 figures, and 1 table.

ASSOCIATION: Irkutskiy gosuniversitet imeni A. A. Zhdanova (Irkutsk State University)

SUBMITTED: 060ct62 DATE ACQ: 05Jun64 ENCL: 01

SUB CODE: OP NO REF SOV: 010 OTHER: 002

ENCLOSURE: 01

ACCESSION NR: AP4036562

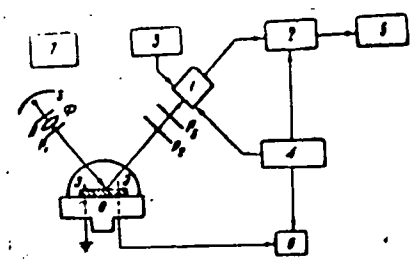

Fig. 1. S- quartz lamp PRK-4; L- lens, O- specimen; P_1- right angle polarization prism, P_2- quarter wave length plate, P_3- right angle polarization prism-analyzer; 1- FEU-29; 2- narrow-band amplifier; 3- generator 3G-10; 4- source power supply; 5- automatic recorder; 6- constant current amplifier; 7- stabilizer.

Card 3/3

METSIK, M.S.; AFANAS'YEVA, R.V.

Free energy of mica crystals. Dokl. AN SSSR 157 no.5:1180-1183 Ag '64. (MIRA 17:9)

1. Fiziko-khimicheskiy institut pri Irkutskom gosudarstvennom universitete. Predstavleno akademikom A.N. Frumkinym.

L 34056-66 EWT(l)/EWT(m)/T IJP(c) GG

ACC NR: AP6025522 SOURCE CODE: UR/0069/66/028/002/0254/0257

AUTHOR: Perovertayev, V. D.; Fetsik, M. S.

ORG: Irkutsk University im. A. Zhdanov (Irkutskiy gosuniversitet)

TITLE: Adsorption of water vapor on mica crystal surfaces

SOURCE: Kolloidnyy zhurnal, v. 28, no. 2, 1966, 254-257

TOPIC TAGS: adsorption, water vapor, crystal surface, mica, bond energy

ABSTRACT: The adsorption of water vapor on surfaces of a fresh crystal fracture was studied. Adsorption isotherms were experimentally obtained for water vapor on mica crystal surfaces at 21 and 30° C. The bond energy of water molecules decreases with increase in thickness of the adsorbed layer, and for sufficiently thick films the bond energy exceeds the energy of evaporation of water molecules from the liquid surface by approximately 50%. The heat of adsorption of water vapor on the surfaces of mica crystals was determined. In the interval p/p_s from 0 to about 0.6, despite the stratification of the sorbed layer, a linear relationship was found to hold between the thickness and p/p_s, which corresponds to the initial segment of the Langmuir adsorption isotherm. Further along the isotherm, the curve rises more or less steeply, pointing to a decrease in bond energy of water molecules.

UDC: 541.183.25

Card 1/2

L 34056-66

ACC NR: AP6025522

with increase in thickness of adsorption layer on the crystal surface. The bond energy of water molecules on muscovite surfaces was found to be approximately $1.2 \cdot 10^{-12}$ erg. Orig. art. has: 5 figures, 4 formulas and 1 table.
[JPRS: 35,998]

SUB CODE: 07,20/ SUBM DATE: 020ct64/ ORIG REF: 009

Card 2/2

L 04256-67 EWT(1) IJP(c) GG

ACC NR: AR6010516 SOURCE CODE: UR/0196/65/000/010/B014/B014

AUTHOR: Afanas'yev, N. V.; Metsik, M. S.; Popova, V. N.

TITLE: Interlayer polarization and dielectric losses in crystals of phlogopite mica

SOURCE: Ref. zh. Elektrotekhnika i energetika, Abs. 10B72

REF SOURCE: Sb. Proboy dielektrikov i poluprovodnikov. M.-L., Energiya, 1964, 346-351

TOPIC TAGS: dielectric material, dielectric property, dielectric loss, dielectric crystal, mica

ABSTRACT: The specific inductive capacitance, loss factor, and resistance of phlogopite of different hardnesses are studied. Experimental data obtained indicate that in phlogopite crystals there are two types of foliations: open (communicating with the atmosphere) and closed. Because of surface conductivity, these foliations lead to interlayer polarization, causing a deterioration in the dielectric properties of the mica. Open foliations determine the field of dispersion and absorption, which is located basically in the range of sonic and radio frequencies. The specific inductive capacitance and the loss factor, determined by open foliations in the direction of a cleavage at 50 cps, may reach 10^2 for hard phlogopite and 10^4 for soft phlogopite. The drop in specific inductive capacitance as a direct function of frequency and the frequency

UDC: 621.315.613.1.011.5

Card 1/2